1

# Hazardous Materials Technical Center

AD-A210 470

INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

GOLD KING CREEK RADIO RELAY STATION, ALASKA

April 1989



Submitted to:

HQ AAC/DEPV
Elmendorf AFB, AK 99506

Submitted by:

Hazardous Materials Technical Center
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852





DYNAMAC CORPORATION
Operated for the Defense Logistics Agency by: DYNAMAC CORPORATION
Corporate Headquarters The Dynamac Building 11140 Rockville Pike Rockville MD 20852 Tel 301-468-2500

## DISTRIBUTION STATEMENT

This report has been prepared for Headquarters Alaskan Air Command/Directorate of Programs and Environmental Planning (HQ AAC/DEPV), Elmendorf Air Force Base, Alaska, by the Hazardous Materials Technical center (HMTC) for the purpose of aiding in the implementation of the Air Force Installation Restoration Program (IRP). This report is approved for public release; distribution is unlimited.

# INSTALLATION RESTORATION PROGRAM

## PRELIMINARY ASSESSMENT

## GOLD KING CREEK RADIO RELAY STATION, ALASKA

April 1989

Submitted to:

HQ AAC/DEPV
Elmendorf AFB, AK 99506

Submitted by:

Hazardous Materials Technical Center
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852

## TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)



FIGURES

EXECUTIVE SUMMARY

## A. Introduction

The Hazardous Materials Technical Center (HMTC) was retained in January 1988 to conduct the Installation Restoration Program (IRP) Preliminary Assessment of the Gold King Creek Radio Relay Station (RRS), Alaska, under Contract No. DLA-900-82-C-4426 with funds provided by the Alaskan Air Command (AAC).

Department of Defense (DoD) policy was directed by Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5 dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program. DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health and welfare that may have resulted from these past operations.

To implement the DoD policy, a four-phased IRP has been directed consisting of:

- Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment;
- Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies, for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a remedial action through preparation of a feasibility study;
- Research, Development, and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation; and

- Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and to implement site remedial action.

The Gold King Creek RRS Preliminary Assessment included:

- an onsite visit, including interviews with six AAC personnel, conducted by HMTC personnel during 12 July through 21 July 1988;
- the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the installation;
- the acquisition and analysis of available geological, hydrological, meteorological, and environmental data from pertinent Federal, State, and local agencies; and
- the identification of one site at the installation that is potentially contaminated with hazardous materials/hazardous wastes (HM/HW).

## B. Major Findings

Past installation operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. The major operations of the installation that used and disposed of HM/HW included management of diesel fuel used to power the generators, management of lead-acid and nickel-cadmium batteries used to store electricity, handling of electrical equipment possibly containing polychlorinated biphenyls (PCBs), and use of asbestos as a construction material.

Interviews with AAC personnel and a review of installation records resulted in the identification of one disposal site at Gold King Creek RRS that is potentially contaminated with HM/HW. This site was assigned a Hazard Assessment Score (HAS) according to the U.S. Air Force Hazard Assessment Rating Methodology (HARM). The following is a summary of the findings at the identified site.

Site No. 1 - Landfill (HAS-49)

A small landfill is located outside the fenceline east of the facility. This landfill was used while the RRS was operational. The landfill reportedly contains sanitary wastes, crushed empty drums, oil filters, cans, and rubble. In 1987, the landfill was covered with 4 to 6 feet of soil and contoured to the existing terrain. The site inspection did not reveal any indication of hazardous waste in the vicinity of the landfill. The landfill is not lined, however, and may contain small quantities of petroleum products and heavy metals from the drums and oil filters. The landfill is on property that is now privately owned.

## C. Conclusions

Small quantities of hazardous materials were used at Gold King Creek RRS while the facility was in operation. The underground diesel tanks at the facility were drained and abandoned in place and the electrical equipment was removed from the site. No evidence of contamination was visible at the time of the site visit. However, asbestos may remain within the radio relay building, and information obtained through interviews and records resulted in the identification of one site at Gold King Creek RRS that is potentially contaminated with HM/HW. This site is Site No. 1 - Landfill.

## D. Recommendations

A limited Site Investigation is recommended to confirm the presence or absence of hazardous contaminants at Site No. 1 - Landfill at Gold King Creek RRS. The final detail of this investigation, including sample locations, sample analysis, and data analysis, can be finalized as part of the Site Investigation program.

The remainder of the hazardous materials (electrical equipment, batteries, and fuels) at Gold King Creek RRS have been removed, the underground tanks have been abandoned in place, and no visible signs of contamination are evident,

therefore, no additional IRP investigation beyond the limited Site Investigation is recommended for the facility. Abatement of any asbestos remaining within the radio relay building is also recommended.

# I. INTRODUCTION

## A. Background

The United States Air Force, due to its primary mission, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, State, and local governments have developed strict regulations to require that disposers of hazardous materials/hazardous wastes (HM/HW) identify the locations and contents of disposal sites and take action to eliminate the hazards in an environmentally responsible manner. The current Department of Defense (DoD) Installation Restoration Program (IRP) policy was directed by Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5 dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of military installations with existing environmental regulations. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the IRP. DoD policy is to identify and fully evaluate suspected problems associated with past HM/HW disposal sites on DoD facilities, to control the migration of hazardous contamination, and to control hazards to health and welfare that may have resulted from these past operations. The IRP is a basis for response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986.

To conduct the IRP Preliminary Assessment for Gold King Creek Radio Relay Station (RRS), the Headquarters Alaskan Air Command/Directorate of Programs and Environmental Planning (HQ AAC/DEPV) retained the Hazardous Materials Technical Center (HMTC) (operated by Dynamac Corporation) in January 1988 under Contract No. DLA-900-82-C-4426.

The Preliminary Assessment comprises the first phase of the DoD IRP and is intended to review installation records to identify possible hazardous waste-contaminated sites and to assess the potential for contaminant migration

from the installation. The Site Investigation (not part of this contract) consists of follow-on field work as determined from the Preliminary Assessment. The Site Investigation includes a preliminary monitoring survey to confirm the presence or absence of contaminants. Upon confirmation of contamination, additional field work is implemented under a Remedial Investigation (not part of this contract) to determine the extent and magnitude of the contaminant migration and provide data necessary for determining appropriate remedial actions, which are evaluated during the Feasibility Study (not part of this contract). Research, Development, and Demonstration (not part of this contract) consists of a technology base development study to support the development of project plans for controlling migration or restoring the installation. Remedial Design/Remedial Action (not part of this contract) includes those activities which are required to control contaminant migration or restore the installation.

## B. Authority

The identification of hazardous waste disposal sites at Air Force installations was directed by Defense Environmental Quality Program Policy Memorandum 81-5 (DEQPPM 81-5) dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations.

## C. Purpose of the Preliminary Assessment

DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites and spill sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health or welfare that may have resulted from these past operations. HMTC evaluated the existence and potential for migration of HM/HW contaminants at Gold King Creek RRS by visiting the installation; reviewing existing installation records concerning the use, generation and disposal of HM/HW; reviewing available environmental information; and conducting interviews with present Air Force personnel who are familiar with past hazardous materials management activities at the installation.

A physical inspection was made of the various facilities and of the suspected sites. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the installation, with special emphasis on the history of past operations and their past HM/HW management procedures; local geological, hydrological, and meteorological conditions that may affect migration of contaminants; local land use that could affect the potential for exposure to contaminants; and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

## D. Scope

The Preliminary Assessment program included a pre-performance meeting, an onsite installation visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at HQ AAC/DEPV, Elmendorf Air Force Base (AFB), Alaska, on 12 July 1988. Attendees at this meeting included representatives of HQ AAC/DEPV and HMTC. The purpose of the pre-performance meeting was to provide detailed project instructions, clarification, and technical guidance by AAC, and to define the responsibilities of all parties participating in the Gold King Creek RRS, Preliminary Assessment.

The scope of this Preliminary Assessment is limited to the installation and includes:

- An onsite visit;
- The acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the installation;
- The acquisition of available geological, hydrological, meteorological, land use, and critical habitat from various Federal, State and local agencies;
- A review and analysis of all information obtained; and
- The preparation of a report to include recommendations for further actions, if warranted.

The onsite visit, records search, and interviews with Air Force personnel were conducted during the period 12 to 21 July 1988. The Preliminary Assessment site visit was conducted by Ms. Janet Emry, Hydrogeologist/Project Manager; Mr. Mark Johnson, P.G./Program Manager; Ms. Kathryn Gladden, Chemical Engineer; and Dr. Naichia Yeh, Environmental Scientist (Appendix A). Other HMTC personnel who assisted in the Preliminary Assessment included Mr. Raymond G. Clark, Jr., P.E./Department Manager. Personnel from AAC who assisted in the Preliminary Assessment included Mr. James W. Hostman, Chief, Environmental Planning HQ AAC/DEPV and Mr. Jeffrey M. Ayres, the Point of Contact (POC) at HQ AAC/DEPV.

## E. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This Preliminary Assessment methodology ensures a comprehensive collection and review of pertinent site specific information, and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

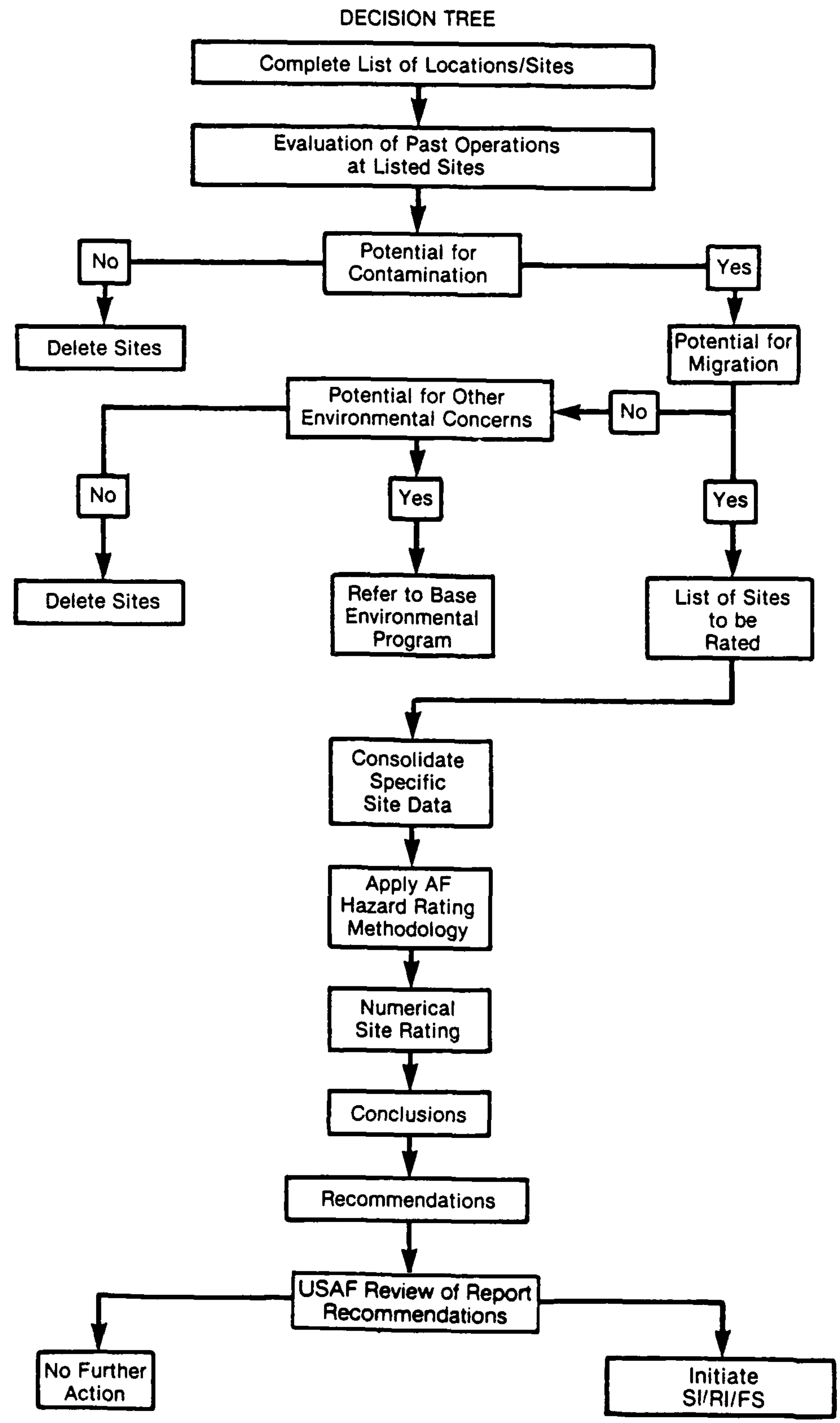
The Preliminary Assessment begins with a site visit to the installation to identify all potential areas where contamination may have resulted from the use or disposal of HM/HW. Next, an evaluation of past HM/HW handling procedures at the identified locations is made to determine whether environmental contamination may have occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with Air Force personnel familiar with the various past operating procedures at the installation. The interviews also define the areas on the installation where any waste materials, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or released into the environment.

Historical records are collected and reviewed to supplement the information obtained from interviews. Using the information outlined above, a list of past waste spill/disposal sites on the installation is identified for further evaluation. A general survey tour of the identified sites, the installation, and the surrounding area is conducted to determine the presence of visible

HMTC PRELIMINARY ASSESSMENT INSTALLATION RESTORATION PROGRAM

**Figure 1.**

**Preliminary Assessment Methodology Flow Chart.**



contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells where they are present.

Detailed geological, hydrological, meteorological, land use, and environmental data for the area of study is also obtained from the POC and from appropriate Federal, State, and local agencies. A list of outside agencies contacted is in Appendix B. Following a detailed analysis of all the information obtained, sites are identified as suspect areas where HM/HW disposal may have occurred. Evidence at these sites suggests that they may be contaminated and that the potential for contaminant migration exists. Where sufficient information is available, sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) and the HARM guidelines (Appendix C). However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather may indicate a lack of data.

# II. INSTALLATION DESCRIPTION

## A. Location

Gold King Creek RRS is located in a remote area approximately 45 miles south of Fairbanks, Alaska, and 40 miles east of the Nenana River and the Alaska Railroad. The RRS is located about 4,500 feet east of Gold King Creek. Specifically, the location of the RRS is in Sections 22 and 27, Township 8 South, Range 2 West, Fairbanks Meridian. The location of Gold King Creek RRS is shown in Figure 2.

The RRS originally consisted of one radio relay building, one microwave tower enclosed by a chain link fence, and a 2,050-foot runway. These facilities total 30.32 acres. Two 14,000-gallon steel underground diesel fuel storage tanks are located west of the building. Figure 3 shows the original facilities at Gold King Creek RRS.

## B. History

Gold King Creek RRS was constructed in 1959 as part of the Ballistic Missile Early Warning System (BMEWS) of the White Alice Communications System (WACS). BMEWS linked Clear AFB to the North American Air Defense (NORAD) headquarters in Colorado. Gold King Creek RRS was part of the BMEWS "B route," which went east from Clear AFB into Canada and then south to NORAD. The RRS was an unattended TD-2 two-way microwave repeater station, which served as a relay between Clear AFB and Canyon Creek RRS. The RRS was leased from the Air Force by RCA Alascom in 1976. The WACS was phased out as its function was replaced by satellite earth stations and commercial long distance carriers. Gold King Creek RRS was closed on 30 March 1982 (Reynolds, 1988).

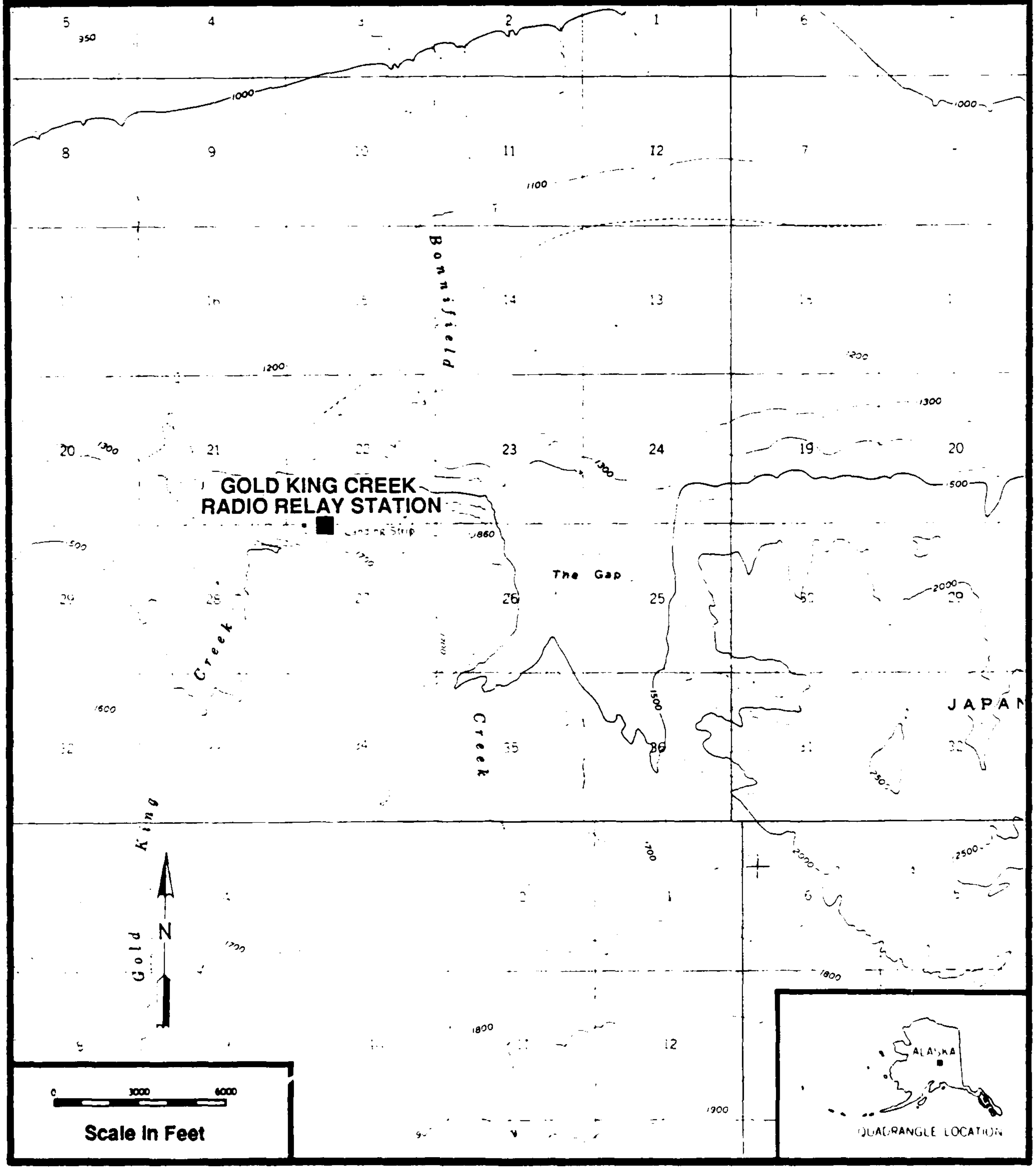
According to records of the 5099th Civil Engineering Operations Squadron (CEOS), Gold King Creek RRS was inspected by the Air Force on the day the facility closed. Outside the fenceline were approximately 300 waste oil drums and several junked vehicles, including a D-6 bulldozer. Within the building

HMTC

Source: U.S.G.S. Fairbanks (A-2) Quadrangle, Alaska, 7.5 Minute Series Topographic Map, 1972.

**Figure 2.**

**Location of Gold King Creek Radio Relay Station, Alaska.**

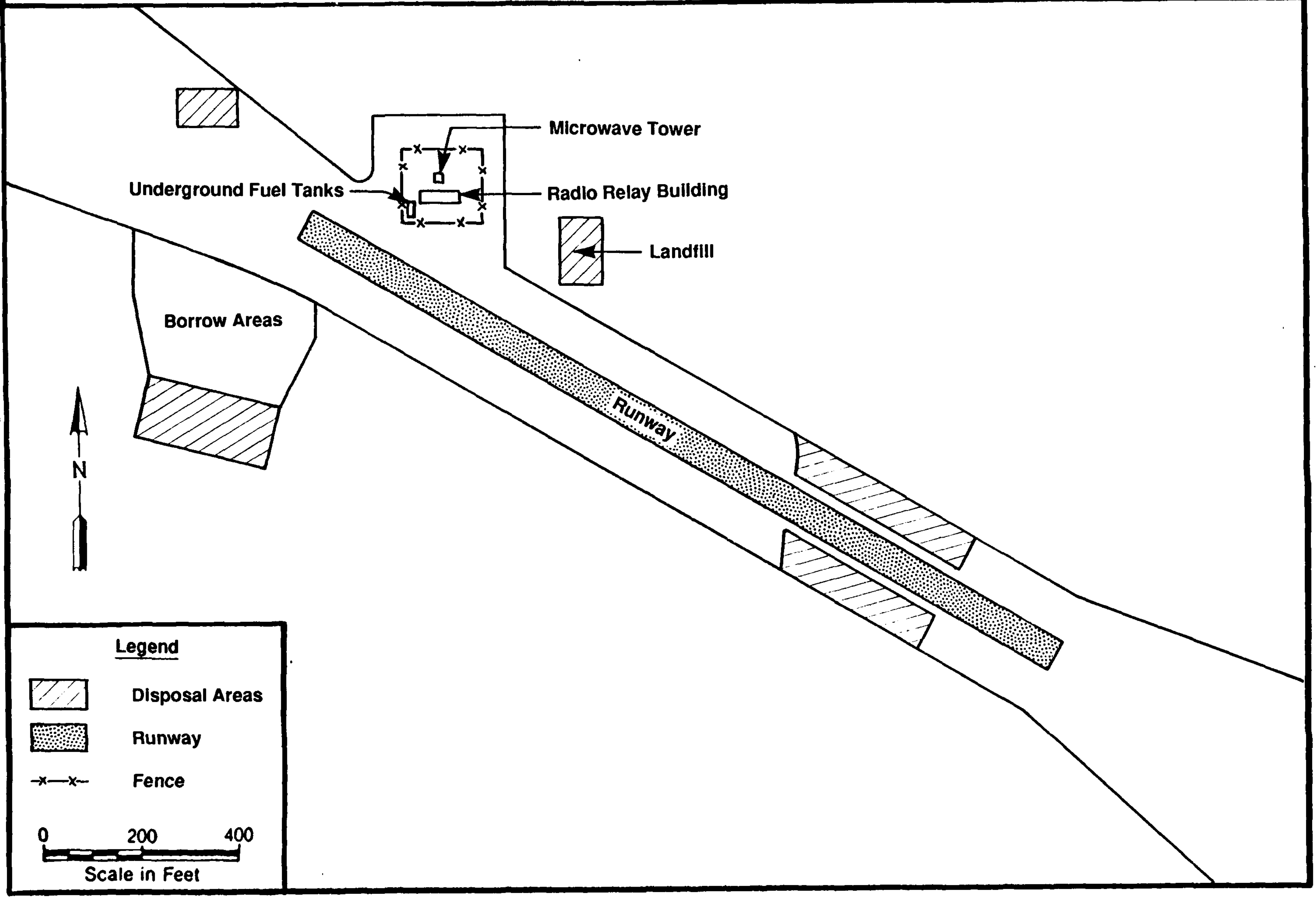


HMTC

Source: U.S. Corps of Engineers
Plot Plan and Vicinity Map,
Gold King Creek AFS, 1959.

Figure 3.

Site Map of Gold King Creek
Radio Relay Station, Alaska.



were 172 lead-acid batteries (drained), ranging in size from 10 to 1,100 pounds. No materials containing polychlorinated biphenyls (PCBs) were found at the RRS (Hostetter, 1984).

In 1985, Gold King Creek RRS was inspected for asbestos and other hazardous wastes. Designs and specifications for asbestos abatement and demolition of the RRS were developed (HMTC, 1985). At that time, the RRS was overgrown with brush and littered with drums (some full of fuel oil and gasoline) and trash. Several large areas of oil-stained soil were present near the front gate of the facility, including an area which originally was a search and rescue fuel cache for the 5010th Air Base Wing from Eielson AFB. A small sanitary waste and drum disposal landfill was found to the east of the facility, outside the fenceline. The landfill contained crushed empty drums, oil filters, cans, and other metal trash. Additional drums were scattered throughout the woods adjacent to the runway. Underground storage tanks containing residual diesel fuel were also present at the RRS. Although PCB-containing electronic components supposedly had been removed, high-voltage capacitors, fuses, and other components were observed. It was unknown if these items contained PCBs (Lipsky, 1985).

In June 1987, the 5099th removed all remaining hazardous materials (except asbestos within the building) from Gold King Creek RRS as part of the Alaska Cleanup Effort (ACE). Materials shipped from the site to the Defense Reutilization and Marketing Office (DRMO) at Fort Wainwright included:

- 128 Lead-acid batteries (drained);
- 29 Small, sealed transformers;
- 84 Small, sealed capacitors;
- 16 Small, sealed relays;
- 11 55-gallon Drums of waste oil; and
- 3 Generators.

The microwave tower was dismantled and, along with three old generators, was buried in a landfill located inside the fenceline east of the building. The brush that had overgrown the site was cleared. Crushed empty drums, brush, and

other debris were buried in a landfill located adjacent to the tower landfill. The building and chain link fence were left intact.

Samples of the stained soil and waste oil were taken and field-tested for PCBs. Samples were also sent to a laboratory for complete analysis. The soil sample locations and results are included as Appendix D. The analyses proved negative for PCBs, toluene, and xylene.

An official from the Alaskan Department of Environmental Conservation recommended that the stained soil be spread on the site for disposal. He also indicated that the underground tanks should be drained and buried, and that the fuel lines should be removed.

The tanks were excavated and drained of approximately 600 gallons of remaining diesel fuel. The tanks were then cut open, and the fuel lines were removed, cut up, and placed into the tanks along with the stained soil, and other rock and soil.

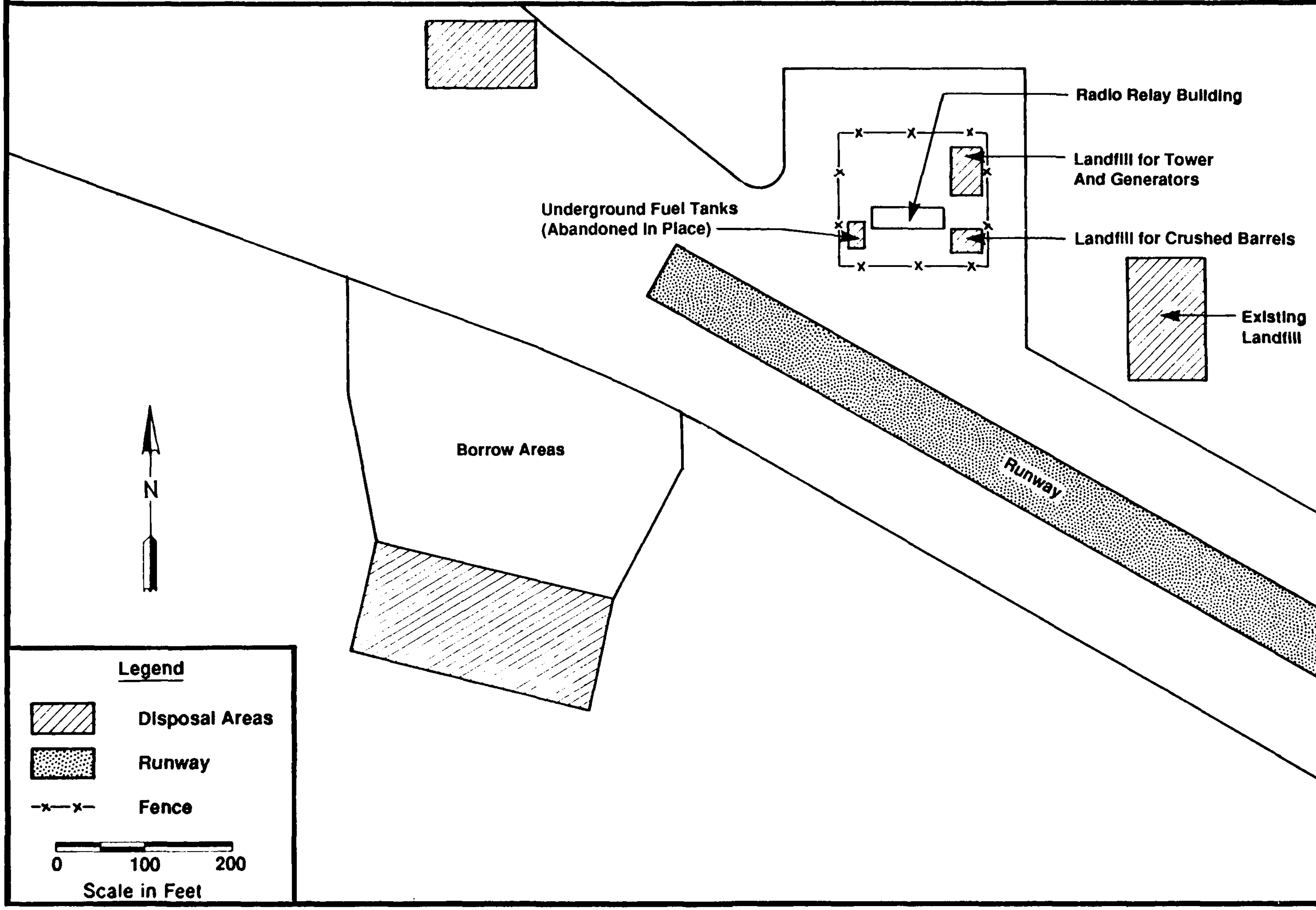
All the landfills, including the existing landfill east of the building, were covered with 4 to 6 feet of soil and landscaped to the contour of the existing terrain. The existing landfill is on property now privately owned. Figure 4 shows the location of the new and existing landfills.

The cleanup operations at Gold King Creek RRS were documented in a "Finding of No Significant Contamination" and a "PCB Clearance Certificate." Copies of these documents are included in Appendix E.

Figure 4.

Source: 5099th CEOS, 1988.

Site Map of Gold King Creek
Radio Relay Station Clean-up.



# III. ENVIRONMENTAL SETTING

## A. Meteorology

Gold King Creek RRS has a continental climate typical of the interior of Alaska. This climate is characterized by extreme seasonal variations in temperature and by low total precipitation.

At Clear, Alaska, located approximately 37 miles west-northwest of Gold King Creek RRS, temperature extremes range from 96°F in summer to 63°F below zero in winter. Annual precipitation averages 13.91 inches, with over half of the total annual rainfall occurring in June, July, and August (Leslie, 1986). Maximum rainfall intensity at Gold King Creek, based on a 10-year, 24-hour rainfall, is 1.7 inches (Miller, 1963). Total annual snowfall averages about 49 inches, with snow generally occurring from October through March (Leslie, 1986). Net precipitation is calculated by subtracting the mean annual lake evaporation from the average annual precipitation (47 FR 31227). Since the mean annual lake evaporation rate is not available for this part of Alaska, the annual potential evapotranspiration rate was used (NOAA, personal communication, 1988). The potential evapotranspiration rate for Clear, Alaska, is 17.38 inches per year (Patric and Black, 1986), therefore the net precipitation is negative 3.47 inches.

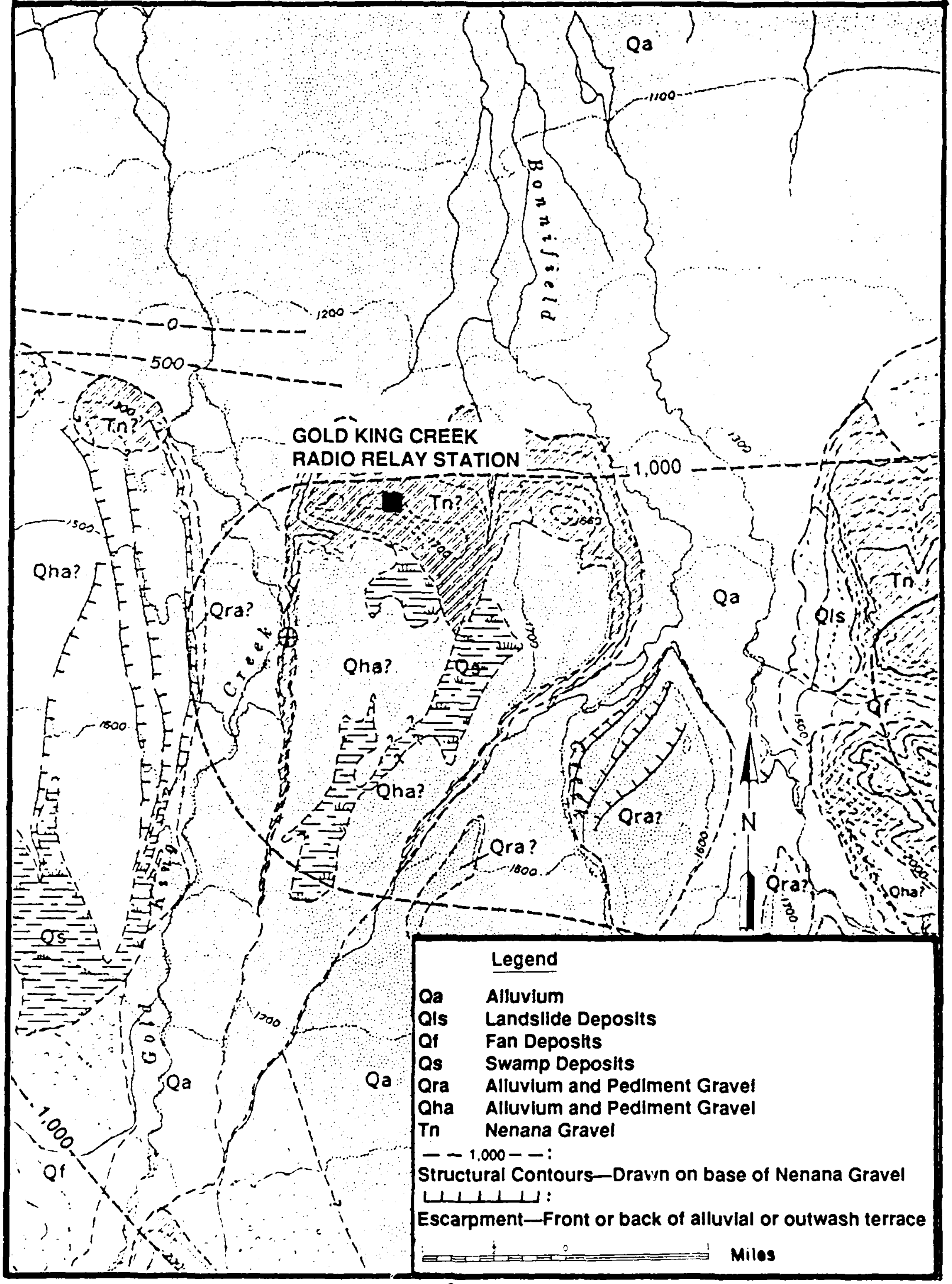
## B. Geology and Soils

Gold King Creek RRS is located on the northern foot of the Alaska Range, on the northward-dipping limb of a structural anticline (Andreasen and others, 1964). The RRS is situated on a bedrock outcrop which is surrounded by Quaternary sediments, including Holocene alluvium, swamp, and landslide deposits, and Pleistocene alluvium and pediment gravels (Wahrhaftig, 1970). Figure 5 illustrates the distribution of these units at the land surface.

Source: U.S.G.S.
Geologic Quad. Map
GQ-808, 1970.

Figure 5.

**Geologic Map of Gold King Creek Radio Relay Station, Alaska and Vicinity.**



The RRS is underlain by the Late Tertiary-age Nenana Gravel, which consists of buff to reddish-brown, poorly consolidated, pebble to boulder conglomerate and coarse sandstone. The upper 1,000 feet of this unit contains pebbles of dark green gabbro with 3 to 5 percent magnetite or ilmenite. Interbedded mudflow deposits, thin claystone layers, and local lignite beds are also present (Andreasen and others, 1964; Wahrhaftig, 1970).

The Nenana Gravel is unconformably underlain by a Tertiary coal-bearing group, which includes the Grubstake, Lignite Creek, Suntrana, and Sanctuary Formations. The Grubstake Formation consists of interbedded dark-gray claystone and sandstone with abundant grains of black chert and other dark minerals and coalified plant remains. The Lignite Creek Formation consists of interbedded, buff, crossbedded, pebbly arkose, greenish-gray silt and clay, and subbituminous coal. The Suntrana Formation is an interbedded, poorly consolidated, pebbly quartz sandstone, silty claystone, and subbituminous coal. The oldest formation within this group, the Sanctuary Formation, consists of poorly consolidated, gray, varved or banded shale (Wahrhaftig, 1970).

A major unconformity separates the Tertiary coal-bearing group from the underlying Mississippian-age Totatlanika Schist. The Totatlanika Formation has two members: the Mystic Creek rhyolite schist and the California Creek quartz-orthoclase-sericite schist and augen gneiss. The Totatlanika Schist is unconformably underlain by the Precambrian Birch Creek Formation, which consists of quartz-sericite schist, quartzite, and carbonaceous schist (Wahrhaftig, 1970).

According to the U.S. Soil Conservation Service, the soils at Gold King Creek RRS are of the very gravelly, hilly to steep Pergelic Cryaquipts-Pergelic Cryochrepts association. The Pergelic Cryaquepts make up 40 percent of the association. These soils are poorly drained and occur on broad high ridges, valleys, footslopes, and steep north-facing slopes. They formed in very gravelly weathered rock or glacial till under a cover of low shrubs, forbs, and mosses, and in some areas at lower elevations, black spruce. Under a mat of partly decomposed organic matter, these soils have a thin layer of dark grayish-brown

gravelly silt loam over mottled gray very gravelly loam or silt loam. Permafrost occurs at shallow depths.

Pergelic Cryochrepts make up 35 percent of this association. These soils are well drained and occur on high ridges and south-facing slopes of somewhat lower hills and moraines. They formed in weathered bedrock material or glacial till under a cover of low shrubs and forbs or, at lower elevations, a sparse forest of stunted white spruce, aspen, and dwarf birch. These soils have a thin black surface layer that is high in organic matter which is underlain by a dark brown silty cambic horizon. The substratum is olive very gravelly silt loam or loam. In places, bedrock is at a depth of 20 to 40 inches.

The remaining soils within this association include Pergelic Cryorthents (15 percent), Pergelic Cryorthods (5 percent), and Typic Cryochrepts (less than 5 percent). These soils are well drained and occupy high benches, ridges, hills, terraces, and moraines. They are typically gravelly silt loam or loam. Rough mountainous lands make up the remainder of this association, and consist of barren rocky ridges, peaks, and talus slopes where there is not enough soil to support vegetation.

## C. Hydrology

### Surface Water

Gold King Creek RRS is located between two northward-flowing streams that drain off the Alaska Range to the south. Bonnifield Creek is located about 1.3 miles east of the RRS and Gold King Creek is located 4,500 feet to the west. The RRS is not within the 100-year flood plain of either of these drainageways. Surface runoff from the northern and eastern portions of the facility drains northward into Bonnifield Creek. Runoff from the western and southern portions of the RRS drains to the west, and then north into Gold King Creek (see Figure 5, page III-2). These creeks empty into the Wood River, which is a tributary to the Tanana River.

These creeks do not serve as a drinking water source and are used for fish and wildlife management.

Groundwater

Specific groundwater data for the Gold King Creek RRS area is not available; however, some general assumptions can be made based on the nature of the soils and geology of the region. Much of the rainfall at Gold King Creek RRS infiltrates into the soil and into the coarse gravels of the Nenana Formation. Because the RRS is situated on the northward-dipping limb of an anticline, the infiltrating rainfall (now groundwater) will saturate the soils and porous units such as the Nenana Gravel and underlying sandstones and may flow toward the north along the rock structure.

Several private residences are located near the RRS; the closest is approximately 500 feet northwest of the facility. These residences may obtain their water from wells. The depth to groundwater in this area is unknown.

## D. Critical Habitats/Endangered or Threatened Species

According to the U.S. Fish and Wildlife Service, Alaska Division, there are no endangered or threatened species of flora or fauna within a 1-mile radius of the Gold King Creek RRS. Several wetland areas are located within a 1-mile radius of the RRS (National Wetlands Inventory, 1987). These include areas of saturated, broad-leaved deciduous or needle-leaved evergreen scrub and shrub and saturated, needle-leaved evergreen forests along the drainageways of Gold King and Bonnifield Creeks. No federally- or state-designated critical habitats or wilderness areas are located within a 1-mile radius of the RRS.

# IV. FINDINGS

## A. Activity Review

A review of AAC records and interviews with Air Force personnel resulted in the identification of specific operations at Gold King Creek RRS in which the majority of HM/HW were handled or generated. These operations included:

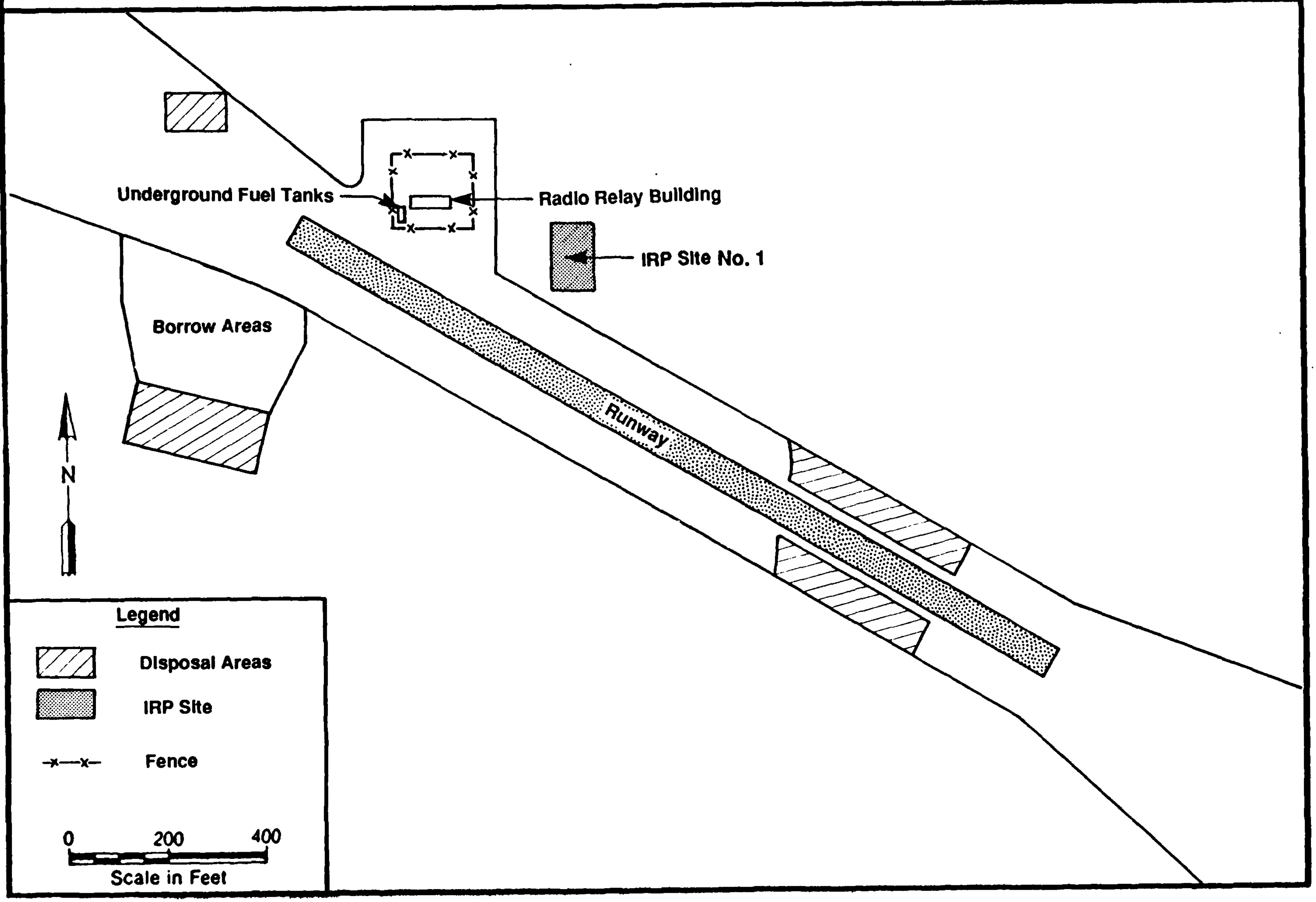
- Management of diesel fuel used to power the generators;
- Management of electrical equipment possibly containing PCBs;
- Management of lead-acid and nickel-cadmium batteries used to store electricity; and
- Usage of asbestos as a construction material.

## B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with Air Force personnel and subsequent site inspections resulted in the identification of one potentially contaminated site at Gold King Creek RRS. The location of this site is indicated in Figure 6. The identified site was assigned a HAS according to HARM; the HARM methodology and guidelines are included as Appendix C. A copy of the completed Hazard Assessment Rating Form is included as Appendix F. The objective of this assessment is to identify and provide a relative ranking of sites suspected of contamination from hazardous substances. The final rating score would reflect specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding). A brief description of the identified site follows.

Source: U.S. Corps of Engineers
Plot Plan and Vicinity Map,
Gold King Creek AFS, 1959.

Figure 6.
Location Map of IRP Sites at Gold King Creek Radio Relay Station, Alaska.



Site No. 1 - Landfill (HAS-49)

In 1985, Gold King Creek RRS was inspected for asbestos and other hazardous wastes (HMTC, 1985). At that time, a small landfill was found to the east of the facility, outside the fenceline. The uncovered, unlined landfill contained sanitary wastes, crushed empty drums, oil filters, cans, and rubble. This landfill was used while the RRS was operational. In June 1985, the landfill was covered with 4 to 6 feet of soil and landscaped to the contour of the existing terrain by the 5099th CEOS.

At the time of the site visit, the landfill was covered with gravel and soil. No evidence of contamination was discovered around the landfill and the land on which this landfill is located is now private property. Although no hazardous wastes were reported to have been disposed of in the landfill, the drums in this landfill may not meet the stipulation of an "empty" container as defined by the U.S. EPA. In addition, the oil filters within the landfill may contain heavy metals. As a result, this site was assigned as HAS according to HARM. This site was scored on the basis of a "small" quantity release (less than 1,100 gallons or 5 tons) of petroleum products and heavy metals.

## C. Other Pertinent Information

At the time of the site visit to Gold King Creek RRS on 14 July 1988, the following observations were made:

- The soil around the facility appeared clean and free from contamination (see Photos 1 and 2, Appendix G);
- Eleven new, full drums of aviation gasoline were present outside the fenceline of the RRS, five by the fence gate and six by the runway. The drums belong to hunters and nearby residents who use the runway. The drums were not leaking (see Photos 3 and 4, Appendix G);
- Several empty drums were scattered throughout the woods surrounding the runway. These did not appear to be of Air Force issue (see Photo 5, Appendix G);

- An uncovered trash pit was discovered in the woods southwest of the runway. It contained empty metal food cans, bottles, one empty drum, and other refuse. None of these items could be identified as Air Force issue (see Photo 6, Appendix G);

- Several disposal areas are located adjacent to the runway (see Figure 2, page II-2). These areas reportedly contain only rubble from construction of the RRS. There were no visible signs of contamination at any of these areas;

- Several private residences are located near the RRS. The closest is approximately 500 feet northwest of the facility (see Photo 7, Appendix G); and

- The radio relay building was not inspected, as it was locked. Asbestos may remain within the building.

# V. CONCLUSIONS

Based on information obtained through interviews with Air Force personnel and review of installation records, small quantities of hazardous materials were handled at Gold King Creek RRS while the facility was operational. Underground storage tanks containing diesel fuel were present at the RRS, as were batteries and electrical equipment possibly containing PCBs.

In 1987, the underground tanks were drained and abandoned in place. The batteries, electrical equipment, and waste oils were removed from the building and sent to DRMO. Results of laboratory analyses of soil samples collected at the RRS were negative for PCBs, toluene, and xylene.

At the time of the site visit, there was no visible evidence of contamination (i.e. stained soil, abandoned drums, or uncovered landfills) at the facility. One potentially contaminated disposal site was identified at the RRS, however. This site, designated Site No. 1, is the small landfill that was used while the RRS was operational. The drums disposed of in this landfill may not meet the U.S. EPA criteria for "empty" containers, and the oil filters in the landfill may contain heavy metals. This site was therefore assigned a HAS according to HARM. The HAS for this site is 49. The only other health and safety concern at Gold King Creek RRS is asbestos that may remain within the radio relay building.

# VI. RECOMMENDATIONS

A limited Site Investigation is recommended to confirm the presence or absence of hazardous contaminants at Site No. 1 - Landfill at Gold King Creek RRS.

Site No. 1 - Landfill (HAS-49)

A soil boring and sampling program is recommended to determine the lateral and vertical extent of soil contamination in the landfill area. If soil contamination is confirmed, the contaminated soil and the source of contamination should be removed. A groundwater monitoring system should also be considered, pending the results of the soil sampling, to determine any migration of hazardous contaminants.

The remainder of the hazardous materials at Gold King Creek RRS have been removed and the underground tanks have been drained and abandoned in place. At the time of the site visit, no visible signs of contamination were evident at the facility. As a result, no further IRP investigation is recommended for the facility. However, the Air Force should proceed with abatement of any asbestos remaining within the radio relay building.

## GLOSSARY OF TERMS

ALLUVIUM - A general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during comparatively recent geologic time by a stream or running water.

ANNUAL PRECIPITATION - The total amount of rainfall and snowfall for the year.

ANTICLINE - A fold, generally convex upward, whose core contains stratigraphically older rocks.

ARKOSE - A feldspar rich sandstone, typically coarse-grained and pink or reddish, that is composed of angular to subangular grains that may be either poorly or moderately well sorted, is usually derived from the rapid disintegration of granite or granitic rocks, and often closely resembles granite.

ASBESTOS - A group of silicate minerals that readily form into thin, strong fibers that are flexible, heat resistant, and chemically inert; used commercially in construction.

AUGEN - In schists and gneisses, large lenticular mineral grains or mineral aggregates having the shape of an eye in cross section.

BEDROCK - A general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.

BOULDER - A detached rock mass larger than a cobble, having a diameter greater than 256 mm, being somewhat rounded or otherwise distinctly shaped by abrasion in the course of transport.

CAMBIC HORIZON - A mineral soil horizon that has a texture of loamy very fine sand or finer, has soil structure rather than rock structure, contains some weatherable minerals, and is characterized by the alteration or removal of mineral material as indicated by mottling or gray colors, stronger chromas or redder hues than in underlying horizons, or the removal of carbonates.

CARBONACEOUS - Said of a rock or sediment that is rich in carbon.

CHERT - A hard, extremely dense or compact microcrystalline sedimentary rock, consisting dominantly of interlocking crystals of quartz.

CLAY [geol] - A rock or mineral fragment or a detrital particle of any composition smaller than a fine silt grain, having a diameter less than 0.004 mm.

CLAY [soil] - A rock or mineral particle in the soil having a diameter less than 0.002 mm (2 microns).

CLAYSTONE - An indurated clay having the texture and composition of shale but lacking its fine lamination or fissility.

COAL - A readily combustible rock containing more than 50% by weight and more than 70% by volume of carbonaceous material including inherent moisture, formed from compaction and induration of variously altered plant remains similar to those in peat.

COARSE-GRAINED - Said of a soil or sediment in which gravel and/or sand predominates.

CONGLOMERATE - A coarse-grained sedimentary rock, composed of rounded pebbles, cobbles, and boulders, set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica, or hardened clay.

CONSOLIDATION - Any process whereby loosely aggregated, soft, or liquid earth materials become firm and coherent rock; specifically the solidification of a magma to form an igneous rock, or the lithification of loose sediments to form a sedimentary rock.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CONTINENTAL CLIMATE - The climate of the interior of a continent, characterized seasonal temperature extremes and by the occurrence of maximum and minimum temperature soon after summer and winter solstice, respectively.

CREEK - A term generally applied to any natural stream of water, normally larger than a brook but smaller than a river.

CRITICAL HABITAT [Fed] - The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection; and specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.

CRITICAL HABITAT [Alaska] - Places where protective emphasis is on the environment in which wildlife occurs. Critical habitats may be complete biotic systems -- identifiable environmental units that operate as self-sustaining systems -- or well-defined areas specifically needed by wildlife for certain functions such as nesting or spawning.

CROSSBEDDED - Strata arranged at an angle to the main stratification.

DECIDUOUS - Shedding foliage at the end of the growing season.

DEPOSITS - Earth material of any type, either consolidated or unconsolidated, that has accumulated by some natural process or agent.

DRAINAGE CLASS [natural] - Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained* - Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
*Somewhat excessively drained* - Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
*Well drained* - Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
*Moderately well drained* - Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops

are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

*Somewhat poorly drained* - Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

*Poorly drained* - Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough periods during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

*Very poorly drained* - Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

DRAINAGEWAY - A channel or course along which water moves in draining an area.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of the Endangered Species Act would present an overwhelming and overriding risk to man.

EVERGREEN - Having foliage that remains green until the formation of new foliage.

FINE-GRAINED - Said of a soil of sediment in which silt and/or clay predominate.

FORB - Any herbaceous plant, not a grass or a sedge.

FORMATION - A lithologically distinctive, mappable body of rock.

GABBRO - A group of dark-colored, basic intrusive igneous rocks composed principally of basic plagioclase and clinopyroxene, with or without olivine and othoxypyrene; approximate intrusive equivalent of basalt.

GLACIAL - (a) Of or relating to the presence and activities of ice or glaciers, (b) Pertaining to distinctive features and materials produced or derived from glaciers and ice sheets.

GLACIAL TILL - See TILL.

GNEISS - A coarse-grained, foliated rock produced by regional metamorphism; commonly feldspar- and quartz-rich.

GRAVEL - An unconsolidated, natural accumulation of rounded rock fragments resulting from erosion, consisting predominantly of particles larger than sand, such as boulders, cobbles, pebbles, granules or any combination of these fragments.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981.)

HAS - Hazard Assessment Score - The score developed by using the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HILL - A natural elevation of the land surface, rising rather prominently above the surrounding land, usually of limited extent and having a well defined outline (rounded) and generally considered to be less than 1,000 feet from base to summit.

HOLOCENE - See RECENT.

ILMENITE - An iron-black, opaque, rhombohedral mineral: $FeTiO_3$; it is the principal ore of titanium.

INTERBEDDED - Beds lying between or alternating with others of different character; especially rock material laid down in sequence between other beds.

LANDSLIDE - A general term covering a wide variety of mass-movement landforms and processes involving the downslope transport of rock and soil en masse.

LIGNITE - A brownish-black coal that is intermediate in coalification between peat and subbituminous coal.

LIMB - One of the two parts of anticline or syncline on either side of the axis.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

MAGNETITE - A black, isometric, strongly magnetic, opaque mineral of the spinel group: $(Fe, Mg)Fe_2O_4$; and important ore of iron.

MISSISSIPPIAN - A period of the Paleozoic era (after the Devonian and before the Pennsylvanian) from 345 to 200 million years ago.

MORAINE - A mound, ridge, or other distinct accumulation of unsorted, unstratified glacial drift, predominantly till, deposited chiefly by direct action of glacier ice, in a variety of topographic landforms that are independent of control by the surface on which the drift lies.

MUDFLOW - A flowage of heterogeneous debris, predominantly fine-grained earth material, possessing a high degree of fluidity during movement.

NATURAL AREA - An area of land or water that has retained its wilderness character, although not necessarily completely natural and undisturbed, or that has rare or vanishing flora, fauna, archaeological, scenic, historical, or similar features of scientific or educational value.

NET PRECIPITATION - Precipitation minus evaporation.

ORTHOCLASE - A colorless, white, yellow, pink, or gray mineral of the alkali feldspar group: $KAlSi_3O_8$.

OUTCROP - That part of a geologic formation or structure that appears at the surface of the Earth; also, bedrock that is covered only by surficial deposits such as alluvium.

PARK - An area of public land known for its natural scenery and preserved for public recreation by a State or national government.

PEDIMENT - Gently inclined planate erosion surfaces covered in bedrock and generally veneered with fluvial gravels.

PERMAFROST - Rock or soil material that has remained below 0°C continuously for two or more years. Permafrost is defined solely on the basis of temperature.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

PLEISTOCENE - The first epoch of the Quaternary period; the Pleistocene began two to three million years ago and lasted until the start of the Holocene period some 8,000 years ago.

POLYCHLORINATED BIPHENYLS (PCBs) - A family of aromatic hydrocarbons in which chlorine atoms have replaced the hydrogen atoms in biphenyl rings. At least 100 different compounds are known as PCBs; these differ in their toxic effects as well as in their chemical and physical properties. PCBs were widely used as insulating fluids in electrical transformers and capacitors.

POROUS - Having numerous interstices, whether connected or isolated.

PRECAMBRIAN - All geologic time, and its corresponding rocks, before the beginning of the Paleozoic; it is equivalent to about 90% of geologic time.

PRESERVE - An area maintained and protected especially for regulated hunting and fishing.

PRISTINE - Something that is still pure or untouched; uncorrupted; unspoiled.

QUARTZ - A crystalline silica, an important rock forming mineral: $SiO_2$. Occurs either in transparent hexagonal crystals (colorless or colored by impurities or in crystalline. Forms the major proportion of most sands and has a widespread distribution in igneous, metamorphic and sedimentary rocks.

QUARTZITE - A metamorphic rock consisting mainly of quartz and formed by recrystallization of sandstone or chert by either regional or thermal metamorphism.

QUATERNARY - The second period of the Cenozoic era, following the Tertiary: it began 3 to 2 million years ago and extends to the present.

RECENT - An epoch of the Quaternary period which covers the span of time from the end of the Pleistocene epoch, approximately 8 thousand years ago, to the present. Also called the Holocene epoch.

RECHARGE AREA - An area in which water is absorbed that eventually reaches the zone of saturation in one or more aquifers.

RHYOLITE - The extrusive (volcanic) equivalent of granite.

RIDGE [geomorph] - A general term for a long, narrow elevation of the Earth's surface, usually sharp-crested with steep sides, occurring either independently or as part of a larger mountain or hill.

RIVER - A general term for a natural freshwater surface stream of considerable volume and a permanent or seasonal flow, moving in a definite channel toward a sea, lake, or another river.

RUNOFF - Rain water that drains over land to surface streams.

SANDSTONE - A medium-grained fragmented sedimentary rock composed of abundant round or angular fragments of sand, size set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material (commonly silica, iron oxide, or calcium carbonate).

SCHIST - A medium or coarse-grained, strongly foliated, crystalline rock; formed by dynamic metamorphism.

SCRUB - A tract of stunted trees or shrubs.

SEDIMENT - (a) Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, or ice, or that accumulates by other natural agents, such as chemical precipitation from solution or secretion by organisms, and that forms in layers on the Earth's surface at ordinary temperatures in a loose, unconsolidated form; (b) strictly solid material that has settled down from a state of suspension in a liquid.

SERICITE - A white, fine-grained potassium mica found in various metamorphic rocks, especially in schists and phyllites.

SHRUB - A woody plant of relatively low height distinguished from a tree by having several stems rather than a single trunk.

SILT [geol] - A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay, having a diameter in the range of 0.004 to 0.063 mm.

SILT [soil] - (a) A rock or mineral particle in the soil, having a diameter in the range 0.002-0.005 mm; (b) A soil containing more than 80% silt-size particles, less than 12% clay, and less than 20%.

SILT LOAM - A soil containing 50 - 88% silt, 0 - 27% clay and 0 - 50% sand.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as to the number of inches per hour that water moves downward through the saturated soil.

Terms describing permeability are:

| | |
|---|---|
| Very Slow | - less than 0.06 inches per hour (less than $4.24 \times 10^{-5}$ cm/sec) |
| Slow | - 0.06 to 0.20 inches per hour ($4.24 \times 10^{-5}$ to $1.41 \times 10^{-4}$ cm/sec) |
| Moderately Slow | - 0.20 to 0.63 inches per hour ($1.41 \times 10^{-4}$ to $4.45 \times 10^{-4}$ cm/sec) |
| Moderate | - 0.63 to 2.00 inches per hour ($4.45 \times 10^{-4}$ to $1.41 \times 10^{-3}$ cm/sec) |
| Moderately Rapid | - 2.00 to 6.00 inches per hour ($1.41 \times 10^{-3}$ to $4.24 \times 10^{-3}$ cm/sec) |
| Rapid | - 6.00 to 20.00 inches per hour ($4.24 \times 10^{-3}$ to $1.41 \times 10^{-2}$ cm/sec) |

Very Rapid - more than 20.00 inches per hour (more than $1.41 \times 10^{-2}$ cm/sec)

(Reference: U.S.D.A. Soil Conservation Service)

SOIL REACTION - The degree of acidity of alkalinity of a soil, expressed in pH values. A soil that tests of pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity of alkalinity is expressed as:

| | pH |
|---|---|
| Extremely acid | Below 4.5 |
| Very strongly acid | 4.5 to 5.0 |
| Strongly acid | 5.1 to 5.5 |
| Medium acid | 5.6 to 6.0 |
| Slightly acid | 6.1 to 6.5 |
| Neutral | 6.6 to 7.3 |
| Mildly alkaline | 7.4 to 7.8 |
| Moderately alkaline | 7.9 to 8.4 |
| Strongly alkaline | 8.5 to 9.0 |
| Very strongly alkaline | 9.1 and higher |

SOIL STRUCTURE - The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are -- platty (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

SUBBITUMINOUS - A black coal, intermediate in rank between lignite and bituminous coals.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

SWAMP - An area intermittently or permanently covered with water, having shrubs and trees but essentially without the accumulation of peat.

SWAMP DEPOSIT - Those sediments which accumulate in a swamp; essentially silt, clay, and organic materials.

TALUS - The sloping mass of rock fragments at the foot of a slope.

TERTIARY - The first period of the Cenozoic era, thought to have covered the span of time between 65 and 3 to 2 million years ago.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TILL - Dominantly unsorted and unstratified drift, generally unconsolidated, deposited directly by and underneath a glacier without subsequent reworking by meltwater, and consisting of a heterogenous mixture of clay, silt, sand and gravel and boulders ranging widely in size and shape

TRIBUTARY - A stream feeding, joining, or flowing into a larger stream or into a lake.

UNCONFORMABLE - Said of strata or stratification exhibiting the relation of unconformity to the older underlying rocks.

UNCONFORMITY - A substantial break or gap in the geologic record where a rock unit is overlain by another that is not next in stratigraphic succession, such as an interruption in the continuity of a depositional sequence of sedimentary rocks or a break between eroded igneous rocks and younger sedimentary strata.

VARVE - A thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake.

WETLANDS - Are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of the Classification of Wetlands and Deepwater Habitats of the United States, wetlands must have one or more of the following three attributes: (1) at least periodically , the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

WILDERNESS AREA - An area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter of the Wilderness Act, an area of underdeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or an primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic or historical value.

# REFERENCES


1. Andreasen, G.E., Wahrhaftig, C., and Zietz, I. Generalized Geology of the East-Central Tanana Lowland, Alaska. U.S. Geological Survey, Geophysical Investigations Map GP-447, 1964.

2. Department of the Interior List of Geological Survey Geologic and Water Supply Reports and Maps for Alaska. Department of the Interior, December 1986.

3 Hassel, J.C. Candidate Environmental Statement for the Phase-Out of the White Alice Communication System. Alaskan Air Command, March 1976.

4. Hazardous Material Technical Center. Hazardous Waste (Asbestos) Abatement from and Demolition of White Alice Sites, Alaskan Air Command, Anchorage, AK - 90% Design and Specifications, Gold King Creek. 1985.

5. Hostetter, M. Inspection of Sites. Memo for Record, U.S. Air Force, 1984.

6. LeFrancois, T.D. The Alaska Cleanup Effort Plan. U.S. Air Force Headquarters Alaskan Air Command, Directorate of Programs and Environmental Planning, 1985.

7. Leslie, L.D. Alaska Climate Summaries, Alaska Climate Center Technical Note No. 3, Arctic Environmental Information and Data Center. September 1986.

8. Lipsky, D. Site Inspection of the White Alice Sites. Memorandum, Dynamac Corporation, Environmental Risk Management Division, 1985.

9. Miller, J.F. Probable Maximum Precipitation and Rainfall Frequency Data of Alaska. U.S. Weather Bureau, Hydrologic Services Division, Technical Paper No. 47, 1963.

10. National Oil and Hazardous Substances Contingency Plan, 47 Federal Register 31224-31235, 16 July 1982.

11. National Wetlands Inventory, Fairbanks (A-2), Alaska. U.S. Department of the Interior, Fish and Wildlife Service, 1987.

12. Patric, J.H. and P.E. Black. "Potential Evapotranspiration and Climate in Alaska by Thornthwaites Classification." Forest Service Research Paper PNW71. Pacific Northwest Forest and Range Experiment Station. Department of Agriculture. Forest Service. Juneau, Alaska. 1968.

13. Pewe, T.L. Quaternary Geology of Alaska. U.S. Geological Survey, Professional Paper 835, 1975.

14. Reiger, S., Schoephorster, D.B., and Furbush, C.E. Exploratory Soil Survey of Alaska. U.S. Department of Agriculture, Soil Conservation Service, 1979.

15. Wahrhaftig, C. Geologic Map of the Fairbanks A-2 Quadrangle, Alaska. U.S. Geological Survey, Geologic Quandrangle Map GQ-808, 1970.

16. Reynolds, G.L. Historical Overview and Inventory: White Alice Communications System. U.S. Army Corps of Engineers, Alaska District, April, 1988.

17. Wahrhaftig, C. Geologic Map of the Fairbanks A-2 Quadrangle, Alaska. U.S. Geological Survey, Geologic Quadrangle Map GQ-808, 1970.

# APPENDIX A

## RESUMES OF PRELIMINARY ASSESSMENT TEAM MEMBERS

JANET SALYER EMRY

## EDUCATION

M.S., geology, Old Dominion University, 1987
B.S. (cum laude), geology, James Madison University, 1983

## EXPERIENCE

Three years' technical experience in the fields of hydrogeology and environmental science, including drilling and placement of wells, well monitoring, aquifer testing, determination of hydraulic properties, computer modeling of aquifer systems, and field and laboratory soils analysis.

## EMPLOYMENT

Dynamac Corporation (1987-present): Staff Scientist/Hydrogeologist

Responsibilities include Preliminary Assessments, Site Investigations, Remedial Investigations, Feasibility Studies, and Emergency Responses to include providing geological and hydrological assessments of hazardous waste disposal/spill sites, determination of rates and extents of contaminant migration, and computer modeling of groundwater flow and contaminant transport. Projects are for the U.S. Air Force and Air National Guard Installation Restoration Program.

Froehling and Robertson, Inc. (1986-1987): Geologist/Engineering Technician

Performed both field and laboratory engineering soils tests.

The Nature Conservancy (1985-1986): Hydrogeologist

Investigated groundwater geology of the Nature Conservancy's Nags Head Woods Ecological Preserve in Dare County, North Carolina. Study included installing wells, monitoring water table levels, determination of hydraulic parameters through a pumping test, stratigraphic test borings, and computer modeling.

Old Dominion University (1983-1985): Teaching Assistant, Department of Geological Sciences

Taught laboratory classes in Earth Science and Historical Geology.

## PROFESSIONAL AFFILIATIONS

Geological Society of America
National Water Well Association/Association of Ground Water Scientists and Engineers

PUBLICATION

Impact of Municipal Pumpage Upon a Barrier Island Water Table, Nags Head and Kill Devil Hills, North Carolina. In: Abstracts with Programs, Geological Society of America, Vol. 19, No. 2, February 1987.

MARK D. JOHNSON

## EDUCATION

B.S., Geology, James Madison University, 1980

## EXPERIENCE

Eight years' technical and management experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance, preparation of statements of work for environmental field monitoring and feasibility studies for the Air Force and the Air National Guard, development of environmental field monitoring programs, and preparation of Preliminary Assessments for the Air National Guard.

## EMPLOYMENT

Dynamac Corporation (1984-present): Senior Staff Scientist/Geologist

Primarily responsible for developing and managing technical support programs relevant to CERCLA related activities for the Air Force, Air National Guard, Department of Justice and Coast Guard. These activities include Statements of Work for Site Investigations (SI), Remedial Investigations (RI), and Feasibility Studies (FS); assessing groundwater at hazardous waste disposal/spill sites for the purpose of determining rates and extents of contaminant migration and for developing SI and RI programs and identifying remedial actions; reviewing SI, RI and FS contractor work plans for various government clients, developing technical and contractual requirements for SI, RI and FS projects, managing the development and preparation of Preliminary Assessments, and assisting clients in the development of their environmental management programs, which included preparation of the Air Force's Installation Restoration Program Management Guidance document.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

## PROFESSIONAL CREDENTIALS

Registered Professional Geologist, South Carolina, #116, 1987

## PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists and Engineers

## KATHRYN A. GLADDEN

### EDUCATION

B.S., chemical engineering (minor in biological sciences), University of Washington, 1978

### SECURITY CLEARANCE

Secret DOD clearance

### EXPERIENCE

Seven years of experience in hazardous waste consulting and plant process engineering. Experience includes development of engineering alternatives for reduction of in-plant effluents and preparation of RCRA background listing documents for the plastics industry.

### EMPLOYMENT

Dynamac Corporation (1985-present): Staff Engineer

Performs studies on the feasibility of solvent recycling, including the evaluation of several alternatives. Studies to date have included 15 sites. For each site, prepared reports describing present practice for solvent use and disposal, and conducted economic analyses of options.

Conducted preliminary site investigations and ranking of hazardous waste sites for the U.S. Federal Bureau of Prisons. Prepared reports detailing site investigation findings and recommendations for Phase II monitoring and sampling.

Preparing statement of work for a Phase IV-A remedial action plan for the Air Force's Installation Restoration Program.

Conducted analysis of public comments on Advanced Notice of Public Rulemaking to establish National Primary Drinking Water Regulations for radionuclide contaminants.

Peer Consultants (1984-1985): Staff Engineer

Developed background documents for listing of RCRA hazardous wastes.

Engineering Science (1983-1984): Staff Engineer

Conducted regulatory policy review and technology assessment of transportation and decontamination procedures for acutely hazardous wastes. Project engineer for development of a cost analysis methodology for the U.S. Army Toxic and Hazardous Materials Agency Installation Restoration Program.

Weyerhaeuser Company (1978-1983): Chemical Engineer

Conducted plant environmental audits to develop in-plant effluent load balances; developed capital alternatives and improved operating procedures for in-plant effluent reduction; developed and implemented recommendations for plant energy conservation and process optimization programs; investigated industrial hygiene impacts of wood pyrolysis air emissions, and performed pilot trials for wood gasification and pyrolysis technology development.

PROFESSIONAL AFFILIATIONS

Tau Beta Pi Engineering Honorary
Society of Women Engineers

NAICHIA YEH

EDUCATION

Ph.D., Environmental Sciences, The University of Texas at Dallas, 1987
M.S., Environmental Sciences, The University of Texas at Dallas, 1984
B.S., Physics, *National Taiwan Normal* University, 1978

EXPERIENCE

Nine years of combined academic and technical experience in hazardous waste management and in supplying technology-based solutions to environmental problems, including environmental assessment and evaluation of the nature and the potential environmental impacts of hazardous waste. Has extensive knowledge in computer-aided modeling methodology.

EMPLOYMENT

Dynamac Corporation (1987-present): Environmental Scientist

Conducts preliminary assessments of suspected hazardous materials/hazardous waste sites at military installations in order to identify, and evaluate potentially hazardous waste disposal sites. Also, quantifies contamination at these sites and analyzes the data in order to determine both short-term and long-term public health effect as well as future risks that may result from exposure to the site contaminants.

Provides technical information consultation to clients with inquiries regarding state-of-the-art technology, current regulations and hazards associated with usage of hazardous materials. Also provides guidance on proper transportation and disposal methods of hazardous wastes, safe storage and handling for hazardous materials, and hazards associated with chemicals and substances.

Provides computerized management services support for environmental contracts to the Hazardous Material Management Division of the Dynamac Corporation. Conducts scientific data processing and data analysis, and develops databases for managing work assignments and contracts.

Developed an electronic hazardous assessment rating system which is a fully computerized version of the U.S. Air Force Hazardous Assessment Rating System. Designed a technical inquiry data base system to keep track of the technical inquiry service requests received by the Hazardous Materials Technical Center operated by Dynamac Corporation. Implemented an efficient methodology for preparing the project expense reports to support program management functions.

The University of Texas at Dallas (1985-1987): Research Assistant

Participated in an environmental assessment and design project which involved the evaluation of the nature and potential impact of hazardous waste. This project included the design of field and laboratory programs for the collection of data used with computer-aided modeling, the site assessment of the proposed hazardous waste facilities, the field sampling and hazardous waste characterization, the zoning of polluted site, the design of remedial cleanup program, and the conceptual design of the hazardous waste disposal plan based on the onsite investigation and computer modeling results.

The University of Texas at Dallas (1984-1985): Computer Laboratory Consultant

Instructed students in microcomputer application and computer programming languages. Conducted scientific data processing and data analysis. Developed a regression analysis program with Lotus 1-2-3. The program integrates five regression mechanisms and takes full advantage of Lotus 1-2-3's keyboard macro and graphic abilities.

The University of Texas at Dallas (1983): Teaching Assistant

Taught numerical analysis and applied mathematics in environmental engineering.

Peitou High School (1979, 1982): Science Teacher

Taught physics, mathematics, computer sciences, and environmental education.

ROC Army (1980-1981): Research Scientist

Conducted environmental surveys and evaluations.

HARDWARE

IBM 360/370., IBM 4341, IBM 4381, IBM PC/XT/AT, IBM PS/2 and compatibles, TI Professional, TI 59, TI 990, and Apple computer family

SOFTWARE

Wylber, Music, CMS, SAS, MS-DOS, CP/M, and various PC-based software systems such as Lotus 1-2-3, DBaseIII+, plus different graphics and data communication utilities; languages used include FORTRAN, BASIC, PL/1, and Pascal

# RAYMOND G. CLARK, JR.

## EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., Mechanical Engineering, University of Maryland, 1949

## SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

## CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

## EXPERIENCE

Thirty-one years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

## EMPLOYMENT

<u>Dynamac Corporation (1986-present)</u>: Program Manager/Department Manager

Responsible for activities relating to Preliminary Analysis, Site Investigations, Remedial Investigations, Feasibility Studies, and Remedial Action for the Installation Restoration Program for the U.S. Air Force, Air National Guard, Bureau of Prisons, and the U.S. Coast Guard, including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; preparation of Air Force Installation Restoration Program Management Guidance; and preparation of Part B permits.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested

in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75

million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

## PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

# APPENDIX B

## OUTSIDE AGENCY CONTACT LIST

## OUTSIDE AGENCY CONTACT LIST

Alaskan Department of Environmental Conservation
3601 C Street, Suite 1350
Anchorage, AK 99508
Bruce Erickson and James Hayden, (907) 563-6529

Arctic Environmental Information and Data Center
University of Alaska
707 A Street
Anchorage, AK 99501
(907) 257-2733

National Oceanic and Atmospheric Administration
Office of Hydrology
Grammax Building
8060 13th Street
Silver Spring, MD 20910
(301) 427-7543

National Oceanic and Atmospheric Administration
701 C Street, Box 38
Anchorage, AK 99513
(907) 271-5040

State of Alaska Department of Natural Resources
Division of Geological and Geophysical Surveys
3700 Airport Way
Fairbanks, AK 99709-4609
Mark Robinson (907) 474-7147

U.S. Fish and Wildlife Services
1011 East Tudor Road
Anchorage, AK
Ronald Garrett, (907) 786-3435

U.S. Fish and Wildlife Service
1412 Airport Way
Fairbanks, AK 99701-8524
R.E. (Skip) Ambrose, (907) 456-0239

U.S. Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092

U.S. Geological Survey
4200 University Drive
Anchorage, AK 99508
Oscar J. Ferrians, Jr., (907) 561-1181

U.S. Soil Conservation Service
201 East 9th Avenue, Suite 300
Anchorage, AK
(907) 271-2424

# APPENDIX C

## USAF HAZARD ASSESSMENT RATING METHODOLOGY AND GUIDELINES

# USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Preliminary Assessment phase of its Installation Restoration Program (IRP).

## PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

## DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contaminant migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site the the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/maximum score subtotal).

The waste characteristics category is scored in three stages. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

| Rating Factors | Rating Scale Levels 0 | 1 | 2 | 3 | Multiplier |
|---|---|---|---|---|---|
| A. Population within 1,000 feet (includes on-base facilities) | 0 | 1-25 | 26-100 | Greater than 100 | 4 |
| B. Distance to nearest water well | Greater than 3 miles | 1 to 3 miles | 3,001 feet to 1 mile | 0 to 3,000 feet | 10 |
| C. Land Use/Zoning (within 1-mile radius) | Completely remote (zoning not applicable) | Agricultural | Commercial or Industrial | Residential | 3 |
| D. Distance to installation boundary | Greater than 2 miles | 1 to 2 miles | 1,001 feet to 1 mile | 0 to 1,000 feet | 6 |
| E. Critical environments (within 1-mile radius) | Not a critical environment | Natural areas | Pristine natural areas; minor wetlands; preserved areas; presence or economically important natural resources susceptible to contamination | Major habitat of an endangered or threatened species; presence of recharge area major wetlands | 10 |
| F. Water quality/use designation of nearest surface water body | Agricultural or industrial use | Recreation, propagation and management of fish and wildlife | Shellfish propagation and harvesting | Potable water supplies | 6 |
| G. Ground-water use of uppermost aquifer | Not used, other sources readily available | Commercial, industrial, or irrigation, very limited other water sources | Drinking water, municipal water available | Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available | 9 |
| H. Population served by surface water supplies within 3 miles downstream of site | 0 | 1-50 | 51-1,000 | Greater than 1,000 | 6 |
| I. Population served by aquifer supplies within 3 miles of site | 0 | 1-50 | 51-1,000 | Greater than 1,000 | 6 |

## II. WASTE CHARACTERISTICS

### A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

### A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records

Logic based on the knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

### A-3 Hazard Rating

| Rating Factors | Rating Scale Levels 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Toxicity | Sax's Level 0 | Sax's Level 1 | Sax's Level 2 | Sax's Level 3 |
| Ignitability | Flash point greater than 200° F | Flash point at 140° F to 200° F | Flash point at 80° F to 140° F | Flash point less than 80° F |
| Radioactivity | At or below background levels | 1 to 3 times background levels | 3 to 5 times background levels | Over 5 times background levels |

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

| Hazard Rating | Points |
|---|---|
| High (H) | 3 |
| Medium (M) | 2 |
| Low (L) | 1 |

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

| Point Rating | Hazardous Waste Quantity | Confidence Level of Information | Hazard Rating |
|---|---|---|---|
| 100 | L | C | H |
| | L | C | M |
| 80 | M | C | H |
| 70 | L | S | H |
| 60 | S | C | H |
| | M | C | M |
| | L | S | M |
| 50 | L | C | L |
| | M | S | H |
| | S | C | M |
| | S | S | H |
| 40 | M | S | M |
| | M | C | L |
| | L | S | L |
| | S | C | L |
| 30 | M | S | L |
| | S | S | M |
| 20 | S | S | L |

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

| Persistence Criteria | Multiply Point Rating From Part A by the Following |
|---|---|
| Metals, polycyclic compounds, and halogenated hydrocarbons | 1.0 |
| Substituted and other ring compounds | 0.9 |
| Straight chain hydrocarbons | 0.8 |
| Easily biodegradable compounds | 0.4 |

C. Physical State Multiplier

| Physical State | Multiply Point Total From Parts A and B by the Following |
|---|---|
| Liquid | 1.0 |
| Sludge | 0.75 |
| Solid | 0.50 |

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

| Rating Factors | Rating Scale Levels: 0 | 1 | 2 | 3 | Multiplier |
|---|---|---|---|---|---|
| Distance to nearest surface water (including drainage ditches and storm sewers) | Greater than 1 mile | 2,001 feet to 1 mile | 501 feet to 2,000 feet | 0 to 500 feet | 8 |
| Net precipitation | Less than -10 inches | -10 to +5 inches | +5 to +20 inches | Greater than +20 inches | 6 |
| Surface erosion | None | Slight | Moderate | Severe | 8 |
| Surface permeability | 0% to 15% clay ($>10^{-2}$ cm/sec) | 15% to 30% clay ($10^{-2}$ to $10^{-4}$ cm/sec) | 30% to 50% clay ($10^{-4}$ to $10^{-6}$ cm/sec) | Greater than 50% clay ($<10^{-6}$ cm/sec) | 6 |
| Rainfall intensity based on 1-year 24-hour rainfall (Number of thunderstorms) | <1.0 inch (0-5) | 1.0 to 2.0 inches (6-35) | 2.1 to 3.0 inches (36-49) | >3.0 inches (>50) | 8 |

B-2 Potential for Flooding

| Rating Factors | 0 | 1 | 2 | 3 | Multiplier |
|---|---|---|---|---|---|
| Floodplain | Beyond 100-year floodplain | In 100-year floodplain | In 10-year floodplain | Floods annually | 1 |

B-3 Potential for Ground Water Contamination

| Rating Factors | 0 | 1 | 2 | 3 | Multiplier |
|---|---|---|---|---|---|
| Depth to groundwater | Greater than 500 feet | 50 to 500 feet | 11 to 50 feet | 0 to 10 feet | 8 |
| Net precipitation | Less than -10 inches | -10 to +5 inches | +5 to +20 inches | Greater than +20 inches | 8 |
| Soil permeability | Greater than 50% clay ($<10^{-6}$ cm/sec) | 30% to 50% clay ($10^{-4}$ to $10^{-6}$ cm/sec) | 15% to 30% clay ($10^{-2}$ to $10^{-4}$ cm/sec) | 0% to 15% clay ($>10^{-2}$ cm/sec) | 8 |
| Subsurface flows | Bottom of site greater than 5 feet above high ground-water level | Bottom of site occasionally submerged | Bottom of site frequently submerged | Bottom of site located below mean ground-water level | 8 |

B.3 Potential for Ground Water Contamination Continued

| Rating Factors | Rating Scale Levels 0 | 1 | 2 | 3 | Multiplier |
|---|---|---|---|---|---|
| Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.) | No evidence of risk | Low risk | Moderate risk | High risk | 8 |

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

| Waste Management Practice | Multiplier |
|---|---|
| No containment | 1.0 |
| Limited containment | 0.95 |
| Fully contained and in full compliance | 0.10 |

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

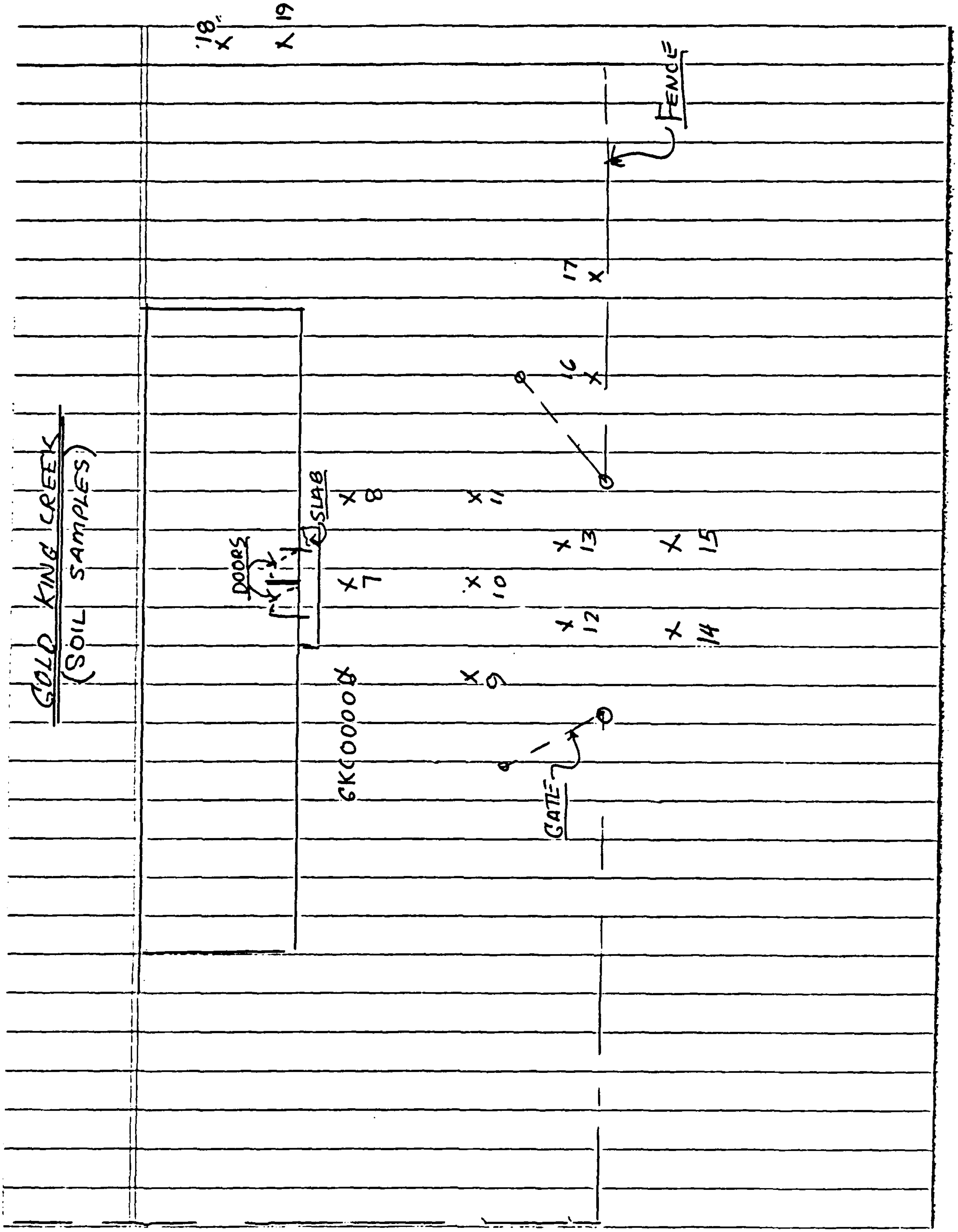
Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III 6-3, then leave blank for calculation of factor score and maximum possible score.

# APPENDIX D

# 5099th CEOS PCB SAMPLING AND RESULTS



GOLD KING CREEK
(SOIL SAMPLES)
DOORS
SLAB
GKC00000
7
8
9
10
11
12
13
14
15
16
17
18
19
GATE
FENCE

# McGRAW-EDISON

**PCB FIELD TEST KIT**

GOLD KING CREEK
26 JUNE 87

## PERMANENT DATA RECORD

| LOCATION | ~~[illegible]~~ NO. ~~TRANSFORMER~~ IDENTIFICATION SOIL SAMPLE NO. | DATE 6/87 | PROBE RESPONSE mv | PCB AS 1260 ppm | PCB AS 1242 ppm | REMARKS |
|---|---|---|---|---|---|---|
| GOLD KING CREEK IN FRONT OF BLDG | 6 | 6-27 | 157 | <5 | <5 | |
| " | 7 | 6-27 | 158 | " | " | |
| " | 8 | 6-27 | 146 | " | " | |
| " | 9 | 6-27 | 159 | " | " | |
| " | 10 | 6-27 | 161 | " | " | |
| " | 11 | 6-27 | 160 | " | " | |
| " | 12 | 6-27 | 158 | " | " | |
| " | 13 | 6-27 | 160 | " | " | |
| " | 16 | 6-27 | 156 | " | " | |
| " | 17 | 6-27 | 153 | <5 | <5 | |
| EAST OF BLDG OUT SIDE OF FENCE | 18 | 6-27 | 152 | | | |
| " " | 19 | 627 | 156 | " | " | |
| WEST OF BLDG - 150' from Fence | 20 | 6-27 | 154 | " | " | |

577 3400 3077121 474498 07 4541Z
674400

# APPENDIX E

## FINDING OF NO SIGNIFICANT CONTAMINATION AND PCB CLEARANCE CERTIFICATE

Finding of No Significant Contamination

GOLD KING CREEK RADIO RELAY SITE

This excess real property contains no known contamination as specified by Resource Conservation and Recovery Act of 1976 (RCRA), as amended, the Toxic Substance Control Act of 1976, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, the implementing Environmental Protection Agency, federal regulations (40 CFR 261, 262, 263, and 761), and the Federal Property Management Regulations (41 CFR 101).

James W Hostman

JAMES W. HOSTMAN
Chief, Environmental Planning Division, AAC
Chairperson/MAJCOM Environmental Protection Committee

Description of Site:

A parcel of land to be excessed is in the SW 1/4 of Section 22 and NW 1/4 of Section 27, Township 8 South, Range 2 West, Fairbanks meridian.

The excess area is more specifically described at TAB-A of the Declaration of Excess.

PCB Clearance Certificate

GOLD KING CREEK RADIO RELAY SITE

This is to certify that a records search and an on-site inspection indicate that this property has not been exposed to PCB materials or equipment.

James W Hostman
JAMES W. HOSTMAN
Chief, Environmental Planning Division, AAC
Chairperson/MAJCOM Environmental Protection Committee

Description of Site:

A parcel of land to be excessed is in the SW 1/4 of Section 22 and NW 1/4 of Section 27, Township 8 South, Range 2 West, Fairbanks meridian.

The excess area is more specifically described at TAB-A of the Declaration of Excess.

# APPENDIX F

## SITE FACTOR RATING CRITERIA AND HAZARD ASSESSMENT RATING FORM

## Gold King Creek Radio Relay Station, Alaska

### USAF Hazard Assessment Rating Methodology
### Factor Rating Criteria

| 1. RECEPTORS CATEGORY | RATING SCALE LEVELS | NUMERICAL VALUE |
|---|---|---|
| Population within 1,000 feet of site: | | |
| Site No. 1 | 1 to 25 | 1 |
| Distance to nearest well: | | |
| Site No. 1 | 0 to 3,000 feet* | 3 |
| Land use/zoning within 1-mile radius: | Residential | 3 |
| Distance Base boundary: | | |
| Site No. 1 | Outside RRS boundary | 3 |
| Critical environments within 1-mile radius: | Pristine natural areas; minor wetlands preserved areas, presence or economically imported natural resources susceptible to contamination | 2 |
| Water quality of nearest surface water body: | Recreation, propogation, and management of fish and wildlife | 1 |
| Groundwater use of uppermost aquifer: | Drinking water, no municipal water available* | 3 |
| Population served by surface water supply within 3 miles downstream of site: | 0 | 0 |

---

*assumed value

Gold King Creek Radio Relay Station, Alaska

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

| 1. RECEPTORS CATEGORY (Continued) | RATING SCALE LEVELS | NUMERICAL VALUE |
|---|---|---|
| Population served by groundwater supply within 3 miles of site: | 1 to 50* | 1 |
| **2. WASTE CHARACTERISTICS** | | |
| Quantity: | | |
| Site No. 1 | Small quantity | S |
| Confidence Level: | | |
| Site No. 1 | Suspected | S |
| Hazard Rating: | | |
| <u>Toxicity</u> | | |
| Site No. 1 | Sax's Level 3 | 3 |
| <u>Ignitability</u> | | |
| Site No. 1 | Flash point between 140°F and 200°F* | 1 |
| <u>Radioactivity</u> | | |
| Site No. 1 | At or below background levels | 0 |
| Persistance Multiplier: | | |
| Site No. 1 | Metals, polycyclic compounds and halogenated hydrocarbons | 1.0 |
| Physical State Multiplier: | | |
| Site No. 1 | Liquid | 1.0 |

---

*assumed value

Gold King Creek Radio Relay Station, Alaska

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

| 3. PATHWAYS CATEGORY | RATING SCALE LEVELS | NUMERICAL VALUE |
|---|---|---|
| Evidence of Contamination: | | |
| Site No. 1 | No evidence | 0 |
| Surface Water Migration: | | |
| Distance to nearest surface water | | |
| Site No. 1 | 4,500 feet | 1 |
| Net precipitation | -3.47 inches/year | 1 |
| Surface erosion | Moderate* | 2 |
| Surface permeability | 15% to 30% clay ($10^{-2}$ to $10^{-4}$ cm/sec)* | 1 |
| Rainfall intensity | 1.7 inches | 1 |
| Flooding: | | |
| Site No. 1 | Beyond 100-year flood plain | 0 |
| Groundwater Migration: | | |
| Depth to groundwater | 50 to 500 feet* | 1 |
| Net precipitation | -3.47 inches/year | 1 |
| Soil permeability | 15% to 30% clay ($10^{-2}$ to $10^{-4}$ cm/sec)* | 2 |
| Subsurface flow | | |
| Site No. 1 | Bottom of site greater than 5 feet above high ground-water level* | 0 |

---

*assumed value

Gold King Creek Radio Relay Station, Alaska

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

| 3. PATHWAYS CATEGORY (Continued) | RATING SCALE LEVELS | NUMERICAL VALUE |
|---|---|---|
| Groundwater Migration: (Continued) | | |
| Direct access to groundwater | No evidence of risk | 0 |
| **4. WASTE MANAGEMENT PRACTICES** | | |
| Practice: | | |
| Site No. 1 | No containment | 1.0 |

HAZARDOUS ASSESSMENT RATIN] FORM

NAME OF SITE SITE NO. 1 - LANDFILL
LOCATION GOLD KING CREEK RRS, ALASKA
DATE OF OPERATION/OCCURRENCE 1959 TO 1982
OWNER/OPERATOR ALASKAN AIR COMMAND
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

| RATING FACTOR | | FACTOR RATING | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| A. POPULATION WITHIN 1000 FEET OF SITE | : | 1 | 4 | 4 | 12 |
| B. DISTANCE TO NEAREST WELL | : | 3 | 10 | 30 | 30 |
| C. LAND USE/ZONING WITHIN 1 MILE RADIUS | : | 3 | 3 | 9 | 9 |
| D. DISTANCE TO INSTALLATION BOUNDARY | : | 3 | 6 | 18 | 18 |
| E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE | : | 2 | 10 | 20 | 30 |
| F. WATER QUALITY OF NEAREST SURFACE WATER | : | 1 | 6 | 6 | 18 |
| G. GROUND WATER USE OF UPPERMOST AQUIFER | : | 3 | 9 | 27 | 27 |
| H. POPULATION (WITHIN 3 MILES) SERVED BY | | | | | |
| DOWN STREAM SURFACE WATER | : | 0 | 6 | 0 | 18 |
| GROUND WATER | : | 1 | 6 | 6 | 18 |
| | | SUBTOTALS | | 120 | 180 |

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 67

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) ( S )
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) ( S )
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) ( H )

FACTOR SUBSCORE A ( 40 )
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
( 40 )( 1 ) = ( 40 )

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
( 40 )( 1 ) = ( 40 )

III. PATHWAY

| RATING FACTOR | | FACTOR RATING | MLTPLR | FACTOR SCORE | MAX. POSSIBLE SCORE |
|---|---|---|---|---|---|

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <LESS THEN 80> EXISTS, PROCEED TO B
( 0 )

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

| RATING FACTOR | | FACTOR RATING | MLTPLR | FACTOR SCORE | MAX. POSSIBLE SCORE |
|---|---|---|---|---|---|
| DISTANCE TO NEAREST SURFACE WATER | : | 1 | 8 | 8 | 24 |
| NET PRECIPITATION | : | 1 | 6 | 6 | 18 |
| SURFACE EROSION | : | 2 | 8 | 16 | 24 |
| SURFACE PERMEABILITY | : | 1 | 6 | 6 | 18 |
| RAINFALL INTENSITY | : | 1 | 8 | 8 | 24 |
| SUBTOTALS | | | | 44 | 108 |
| SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) | | | | | 41 |

2. FLOODING

| | | FACTOR RATING | MLTPLR | FACTOR SCORE | MAX. POSSIBLE SCORE |
|---|---|---|---|---|---|
| FLOODING | | 0 | 1 | 0 | 3 |
| SUBSCORE (100 x FACTOR SCORE /3) | : | | | | 0 |

3. GROUND WATER MIGRATION

| RATING FACTOR | | FACTOR RATING | MLTPLR | FACTOR SCORE | MAX. POSSIBLE SCORE |
|---|---|---|---|---|---|
| DEPTH TO GROUND WATER | : | 1 | 8 | 8 | 24 |
| NET PRECIPITATION | : | 1 | 6 | 6 | 18 |
| SOIL PERMEABILITY | : | 2 | 8 | 16 | 24 |
| SUBSURFACE FLOWS | : | 0 | 8 | 0 | 24 |
| DIRECT ACCESS TO GROUND WATER | : | 0 | 8 | 0 | 24 |
| SUBTOTALS | | | | 30 | 114 |
| SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) | | | | | 26 |

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
( 41 )

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

| | |
|---|---|
| RECEPTORS | ( 67 ) |
| WASTE CHARACTERISTICS | ( 40 ) |
| PATHWAYS | ( 41 ) |
| TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE | ( 49 ) |

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

| GROSS TOTAL SCORE x | WASTE MANAGEMENT PRACTICES FACTOR x | | FINAL SCORE |
|---|---|---|---|
| ( 49 ) | ( 1 ) | = | 49 |

=========

# APPENDIX G

# PHOTOGRAPHS

Photo 1. Front gate of Gold King Creek RRS.

Photo 2. Front of Gold King Creek RRS.

Photo 3. New drums of aviation gasoline in front of the facility.

Photo 4. New drums of aviation gasoline by runway.

Photo 5. Empty drum in forest surrounding runway.

Photo 6. Trash pit located southwest of the runway.

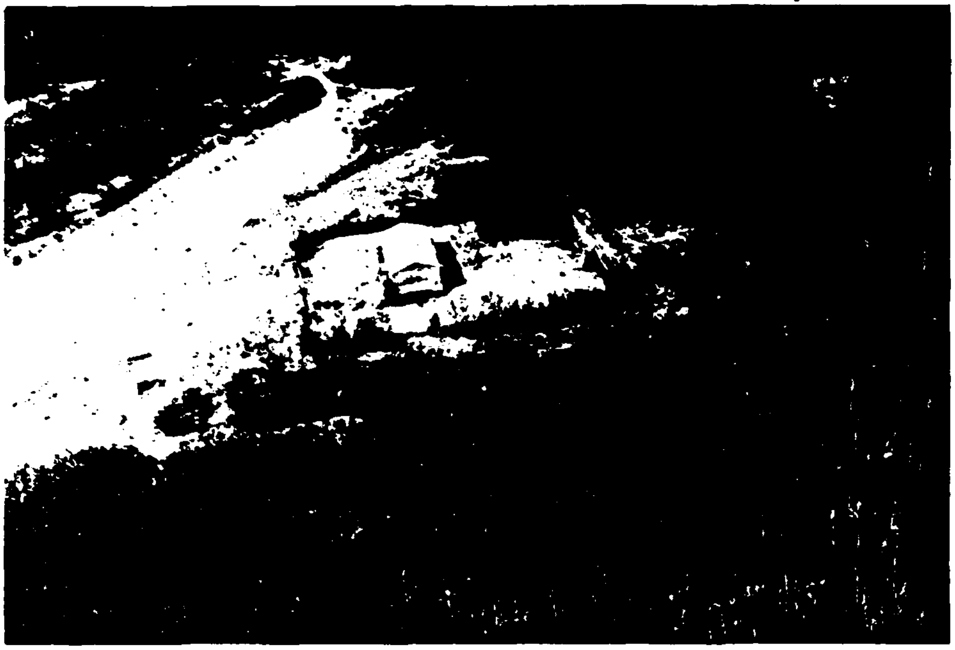


Photo 7. Aerial view of Gold King Creek RRS. Note private residence to the northwest of the facility.